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三维自适应非结构网格的Euler方程解

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3D SOLUTIONS OF THE EULER EQUATIONS ON THE ADAPTIVE TETRAHEDRAL MESHES

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摘要 将 Ausm+ 迎风格式应用于三维非结构网格中求解 Euler方程。对单元变量进行重构以获得空间高阶精度,对时间域采用多步龙格库塔法推进,并采用了当地时间步长和隐式残差光顺技术来加速收敛。采用多点择优推进阵面法生成复杂曲面的三角形网格,利用推进阵面法生成四面体网格。采用网格自适应技术对网格进行局部加密,以减少总体网格数目,从而提高计算效率。最后给出了绕 ONERA M6机翼的跨音速流动及绕麻雀 导弹的超音速流动算例,结果表明了本方法的有效性

关键词： 非结构网格 Euler方程 自适应网格技术 迎风格式

Abstract： The 3D Euler solutions for adaptive tetrahedral grids are presented. Spatial discretization is accomplished by a cell-centered finite-volume formulation using AUSM + upwind scheme. Higher-order accuracy is achieved by applying a novel cell reconstruction processing which avoids solution oscillations without adding explicit limiters. Unstructured grids on the surface block are created by using a new developed algorithm presented in this paper. An adaptive grid algorithm is used in order to enhance the calculation efficiency. Numerical examples include transonic flow around ONERA M6 wing and supersonic flow over Sparrow Ⅲ missile. Comparisons with experimental data are made to evaluate the accuracy and efficiency of the present method.

Keywords： unstructured grid Euler equation adap tive grid technique upw ind scheme

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